THE · EXTENSION PATHOLOGIST

A NEWS LETTER FOR EXTENSION WORKERS INTERESTED IN PLANT DISEASE CONTROL

SERIAL No. 46 OCTOBER 1941.

SOME ESSENTIALS OF A GOOD EXTENSION SPECIALIST

The following article by J. E. Humphrey, extension poultry husbandman, University of Kentucky, appeared in the December 1940 issue of The Extension Poultry Husbandman, a news letter put out by H. L. Shrader, senior extension poultry husbandman of the Washington office. With his consent, it is reproduced here.

1. Be prepared. One should be well grounded in the fundamentals of one's subject and then should keep up to date. County agents expect a specialist to do this because they are too busy to keep up with new developments in all lines of endeavor.

2. Have a plan of work. Make definite plans, and then work your plans. I know what it is to work up a set of plans and then have them rejected. It takes time and patience to arrange plans that will please all parties concerned. Plans, however, are essential for the carrying on of a well-rounded program. If we didn't have definite plans or a program to guide us, we would be like a ship captain at sea without his compass.

3. Be sincere, honest, and prompt. Take your work seriously, but have a sense of humor. Don't put on, but be natural. However, if you find yourself weak in some point, correct it as soon as you can. This can be done by emulating some successful person who is strong in this respect. Practice until you have overcome this weakness and made it a part of your life. The old adage of "Honesty is the best policy" cannot be overemphasized. Since many people are late for engagements, one can become renowned by always being on time. Neither put off until tomorrow what you should do today.

4. Keep all engagements and never complain about the work outlined by county agents. Never make an engagement unless you are going to make every possible effort to fill it. Nothing will hurt you more than falling down on your promises. I can best explain what I mean by telling you a story about two specialists I know. This is a true story told by one of our Kentucky

THE EXTENSION PATHOLOGIST is issued at intervals by the Extension Service and the Bureau of Plant Industry.

county agents to his State agent. "Specialist So-and-So always keeps his appointments, and when he comes to my county he is ready to go wherever I suggest and to do his utmost to help put the job over. He is congenial, happy, and well liked by my farmers. It is not this way with a certain other specialist who on several occasions has called me the day before and canceled his engagements, or if he did come, after finding out my plans he would say, 'What is the use of going over there? Nobody will be out on this rainy day. Anyway, that is just a little job and won't amount to much.' Then, too, he usually talks about what the big fellows are doing, and doesn't seem interested in helping to solve the problems of the average farmer."

5. Be a diplomat. This doesn't mean you always have to be a "yes man" and agree with everybody. However, if you need to say no, do it in such a manner that the opposition will realize your sincerity and present such arguments as will gain your point. By so doing, you will soon have them thinking your way if you are right. Don't be afraid to rejoice when it is necessary or weep when this seems proper. Show interest in helping county agents, farmers, and poultrymen to solve their problems. Speak in language they can understand. By all means don't talk over their heads.

6. Last but not least, be a Christian gentleman. This doesn't mean you are to be a religious fanatic or a sissy. However, it is a wonderful asset for one to possess if you can have it said of you, "There is a man who is a Christian gentleman and who can be depended upon to do what he tells you he will do." If this can be said of you, then you will be a person who regularly attends church and takes part in all phases of worth-while work and serves his community, State, and nation in time of need financially and otherwise.

DEMONSTRATIONS SHOW VALUE OF SORGHUM SEED TREATMENT IN COLORADO

The diseases of sorghums that are economically important in Colorado are covered kernel smut and seed-rot (seedling blight). These two diseases have approximately the same distribution throughout the State. Until the past 2 years, they caused an annual average loss of approximately 30 percent of the yield in grain sorghums alone, or about $406,067. This figure does not take into consideration the lowering in quality and palatability of the smutted grain and forage, which is unquestionably a considerable loss.

The purpose of conducting the seed-treatment work for control for covered kernel smut and seed rot (seedling blight) were (1) To teach

county extension agents and farmers the methods and materials to use for control of those two diseases, (2) to increase the yields and quality of feeds from sorghums, and (3) to increase the income of farmers in Colorado.

Because of the cooperative work conducted by the United States Department of Agriculture Dryland Experiment Station at Akron, Colo., the Colorado Agricultural Experiment Station, and the efforts of the extension plant pathologist and county agents of the Extension Service, as well as sorghum growers, the losses caused by covered kernel smut and seed-rot of sorghums have been reduced from approximately 30 percent of the entire crop to about 5 percent, in the past 2 years. Basing their estimates upon the sales of fungicides, to be used for treating sorghum seed, county extension agents concluded that about 90 percent of the sorghum seed planted in 1940 was treated with one of the recommended fungicides.

In all important sorghum-producing counties, seed-treatment campaigns were conducted, using meetings, news letters, radio talks, and news articles, and in a number of counties, field-plot result demonstrations were conducted. The plots, in most instances, were located adjacent to variety test plot demonstrations so that on farmer tours and field days the two could be included in the same program. At these field days or farm tours, either the extension plant pathologist or the county agent would explain the control methods employed and give the results.

In certain instances, county agents took groups of their farmers to the field days in other counties. In Washington County, where the smut and seed-rot control demonstration plot was located at the United States Department of Agriculture Dryland Experiment Station, approximately 500 farmers observed the plot and heard a talk by the extension plant pathologist regarding the methods and results.

Counties in which either seed-treatment campaigns or demonstration plots, or both of them, were conducted in 1940, were Adams, Baca, Bent, Cheyenne, Crowley, Douglas, Elbert, El Paso, Huerfano, Kiowa, Kit Carson, Larimer, Lincoln, Logan, Morgan, Otero, Phillips, Prowers, Pueblo, Sedgwick, Washington, Weld, and Yuma.

The plots were conducted to demonstrate the comparative effectiveness of different fungicides for controlling covered kernel smut and seed-rot. The seed in each plot was of the same variety and source. In each plot, all the seed was heavily smutted by artificial methods. The smutted seed was then divided into equal lots, and each lot, except the smutted, untreated control, was treated with a different fungicide. By using this method of artificially smutting the seed, each seed treatment had the same chance to demonstrate its effectiveness.

A summarization of data for the sorghum seed treatment plots in all counties shows the following results:

1. Smutted untreated checks.

Thirty-four percent of the plants in the smutted, untreated check replications in the State were infected with covered kernel smut.

The stands of the smutted, untreated 100-foot replications were used as a basis for determining the increase or decrease in the stands of the different seed-treatment replications.

2. New Improved Ceresan (5 percent ethyl mercury phosphate).

Smutted seed, treated at the rate of ½ ounce per bushel, gave complete control of the smut in all plots in the State.

New Improved Ceresan controlled the rotting of seed in the soil and seedling blight to the extent that the average stand, for all 100-foot replications in the State, showed a 108 percent increase.

3. Corona (copper carbonate).

Smutted seed treated with 3 ounces of copper carbonate per bushel had an average smut count, per 100-head count, of 1 percent for all plots. The same seed treatment increased the average stand for all plots 38.5 percent.

4. Cuprocide (red copper oxide).

The average number of smutted heads, per 100-head replications in all plots, for the Cuprocide treatment was 4.7.

The same treatment increased the average stand in the 100-foot replications for all plots 62.4 percent.

5. Yellow Cuprocide (yellow copper oxide).

This seed treatment was used only in the United States Department of Agriculture Dryland Experiment Station plot where it was replicated in three sections of four rows each. Only a trace of smut was present. The same treatment increased the average stand 44.9 percent.

6. Yellow oxide of mercury.

This treatment was used only in the Adams County plot. It controlled all the smut and showed an average increase in stand of 39.9 percent.

The results of these tests show that, under conditions in Colorado, 5 percent ethyl mercury phosphate when used at the rate of ½ ounce per bushel gave the best results for the control of covered kernel smut and seed-rot (seedling blight) of sorghum. Copper carbonate gave the second best results in both the control of smut and seed-rot (seedling blight).

--W. J. Henderson, extension plant pathologist,
Annual Report 1940, Colorado.

TOMATO YIELDS IN UTAH ARE INCREASED BY CLOSER SPACING OF PLANTS

Various planting distances are in general use for tomatoes, as well as for other crops, in different sections of the country. These distances, as a rule, are established by tradition rather than by scientific experimentation. Thus, in the central sections of Utah, tomatoes ordinarily are planted 42 inches apart both ways, i. e., between the rows and between the plants in the row. However, the data accumulated in that State by the writers from their experiments on the control of curly top during a period of 5 years, show quite consistently that the percentage of curly-top infection may be reduced and the yield of tomatoes increased by increasing the plant population to four times the regular number (from about 3,560 to 14,240 plants an acre). The distance between the rows was left unchanged to permit cultivation one way, and only the distance between the hills was reduced.

The decrease in the percentage of curly top on the densely planted plots, as compared with those regularly spaced, ranged in different years from about 4.4 percent to 36.1 percent. This invariably was accompanied by an increase in yield which ranged from about 3 to 9.6 tons an acre. An estimation of prevailing costs of extra plants and extra labor during the period of 5 years, shows: (Once in 1936) the gain was not sufficient to cover these costs; twice (1937 and 1938) it was equal to or slightly greater than these costs; and twice (1939 and 1940) there was an additional net return of $20 to $50 an acre.

In many instances the yield increases were in excess of the amounts that might have been reasonably expected from the improved stands due to the partial curly-top control. It should be noticed that the average individual plant in the dense plots yielded less than the average plant in the regularly spaced blocks, but the average sum of the yield from four plants in the former group was greater than the yield of an average single plant in the latter group.

The yields were compared on the basis of marketable fruit over 2 inches in diameter, such as is accepted by the canneries. At the same time it was found that there was no significant increase in the relative quantity of small fruit (2 inches or less in diameter) in the dense plots, and no significant decrease in the relative quantity of large fruit (over 3 inches in diameter).

The foregoing results were obtained under conditions in Utah, and may not be the same under different environmental and soil conditions. One general conclusion, however, is justifiable; namely that traditional planting distances do not necessarily give the economically ideal plant population and are in need of revision.

-- By Michael Shapalov, senior pathologist; H. Loran Blood, pathologist; and Roy M. Christiansen, agent, Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, United States Department of Agriculture.

1464-41

COST ACCOUNTS OF TWENTY POTATO SPRAY RINGS 1934-1938

Average number of members	12
Average number of acres in each ring	69
Number of pounds of blue vitriol bought per acre	64.67
Blue vitriol, average cost per pound	$0.048
Number of pounds of lime bought per acre	53.4
Lime, average cost per cwt	$0.763
Number of pounds of calcium arsenate bought per acre	6.0
Calcium arsenate, average cost per pound	$0.0709

Average Cost of Spraying per Acre per Year

Blue vitriol	$3.10
Lime	0.41
Calcium arsenate	0.43
Labor, operator	2.29
Repairs - parts	0.99
Gas, oil, grease (Only 10 rings reported)	0.22
Trucking (Mostly done without cost)	0.06
Supervision (8 rings, others free)	0.11
Storage (15 rings, others free)	0.06
Miscellaneous (pails, barrels, interest, etc.)	0.07
Machine (total cost, without interest on investment	0.74
Total	$8.48

--New York Extension Service Plan of Work in Vegetable Gardening, 1941.

ASPARAGUS RUST

A survey was made of a large number of asparagus beds in an attempt to determine whether the rust so prevalent in 1940 and again in 1941 was a new type. It was evident that old plantings of Mary or Martha Washington remained healthy. More recent plantings, however, were affected in some cases. This evidence indicates that we are getting strains which no longer are immune. This was true particularly of a special selection known as Paradise. It was selected for yield and improved quality, and no doubt is an excellent asparagus where rust is not present. It is extremely susceptible, so that some plantings were destroyed completely. In addition, recent strains of Mary Washington grown near it were infected.

There is no satisfactory control for asparagus rust except that of planting resistant strains. All heavily infected plantings should be destroyed, and new resistant strains planted. The nurseryman or seedsman who sells the stock should be requested to make a statement

regarding the resistance of the stock being sold. This will help the grower immediately, and at the same time impress the seedsman with the necessity of testing his asparagus again for immunity.

--Charles Chupp, extension plant pathologist, New York, July 9, 1941.

CELERY YELLOWS

The extension specialist at the College (New York) is beginning to receive the annual questions about celery yellows. The plants turn yellow and remain stunted as if they had been put on a war diet. If the base of the affected stalk is split, there usually is a slight to severe browning of the tissue. A "quisling" by the name of Fusarium is the cause of the trouble.

Since the only control is the use of resistant varieties, we consulted the celery authority, Dr. A. G. Newhall.

"Now, Al, what is the very best celery variety resistant to yellows?" we asked. (Of course, he is "Doctor Newhall" away from home).

"There isn't such a thing as best variety," he retorted quickly.

"Why?"

"Well, one grower will swear that a certain variety is the best on the market, while some other grower insists that some other variety is the only one to grow. But, I'll tell you what I'll do. I will make a list of the available strains so that growers may choose their favorite one."

Following we give Doctor Newhall's list of celery varieties resistant to yellows. If your soil is infested with Fusarium, you might do well to carry the list in your pocket until you can buy your next year's supply of seed.

All green varieties such as Pascal, Utah, and Columbia, are very highly resistant.

The following Golden Self-Blanching varieties are more or less resistant:

1. Michigan Golden. This was the first selection available. (Grand Rapids Vegetable Growers' Association)
2. Golden Pascal. (Ferry-Morse)
3. Masterpiece. (Ferry-Morse)
4. Kilgore's Pride. (Kilgore)

5. Supreme Golden.
6. Cornell #19. (Harris, and Ferry-Morse in 1942)
7. Cornell #6. (Harris, and Ferry-Morse in 1942)

Other varieties that can be grown in cool seasons or as early celery with only slight to moderate infection include several; such as, Golden Prize, Golden Plume, and Early Fortune.

--Charles Chupp, extension plant pathologist,
New York State Farm Bureau News, July 1, 1941.

SOME FACTS REGARDING WORK OF PORTABLE SEED-CLEANING AND TREATING MAC HINES OPERATING IN INDIANA - 1940

Machines operating	44
Bushels of wheat cleaned	435,285
Bushels of wheat cleaned and treated	179,509
Indiana's seed wheat requirement (Fall 1940)	2,660,000
Percentage of Indiana's wheat seed:	
Cleaned	16.4
Treated	6.7

Bushels of barley and oat seed cleaned	59,676
Bushels of soybeans cleaned	48,848
Bushels of clover and grass seed cleaned	4,589

REPORT ON FIRST YEAR'S OPERATION OF HOT-WATER SEED TREATER FOR WHEAT AND BARLEY SMUT CONTROL IN OKLAHOMA

Bushels of grain treated	2,000
Farmers cooperating	107
Experiment stations cooperating	2

Results with Wheat (46 Farmer Reports)

	Percent
Growers reports:	
Good stands from treated seed	88
Poorer stands from treated than untreated seed	12
Little or no difference in stand from treated and untreated seed	84

Percentage of growers reporting

	No smut	Trace of smut	Considerable smut
In wheat from treated seed	90	10	0
In wheat from untreated seed	33	19	48

Results with Barley (8 Farmer Reports)

	Number
Crop failure from both treated and untreated seed	1
Good stand from treated seed	7
No untreated seed planted for comparison	2
Little or no smut in crop from either treated or untreated seed	3
Crop from treated seed, smut free; from untreated seed, smutty	2

--K. Starr Chester, plant pathologist,
Oklahoma, July 1, 1941.

ABOUT ONE OF "DOC" GREGORY'S SCHOOLS

By Geo. Jr.

Reprinted from Grower Talks, Vol. 3, No. 1, May 1939, published by Geo. J. Ball, Inc., West Chicago, Ill. On account of the length of this article it has been necessary to omit parts of it as indicated.

-

On the morning of March 24, Geo. J. and yours truly turned up at the Pickrell range at Elkhart, Ind., with hopes of learning something and with some curiosity about the 1-day schools our genial friend "Doc" Gregory is conducting with such apparent success in his extension work with Indiana growers. Scheduled was a 1-day growers' session dealing with plant diseases and greenhouse soils and was open to all growers, but designed particularly for the florist in the Northern Indiana district.

First thing after the three or four dozen in attendance were rounded up from the greenhouses, Doc passed around mimeographed sheets containing 30 statements on grower problems, which were to be checked as true or false. Collegians taking a final examination couldn't have been more studious and quiet during the next 15 minutes designated for filling in these blanks. And, of course, the thought required in going over these questions (and they weren't easy by any means!) paved the way for the lively discussions that followed.

Discussion of greenhouse soils centered around two principal topics: Conditioning of the soil before using it in the greenhouse, that brought out the questions of soil sterilization and composting; and the question of soil acidity and its complicated relation to availability of nutrient materials that so markedly affects plant growth. The feud of long standing, steam vs. hot-water sterilization, took up more than its allotted time but was well aired and to the edification of all present. . . .

One of the questions most of us slipped up on concerned the old practice of coating the inside of raised beds with whitewash, intending, of course, to kill bacterial and fungous growth that may be lodged in cracks and crevices in boards. Doc blasted this idea, saying that the bacterial and fungous-killing power of such treatment is practically nil. He suggested a dilute formaldehyde solution, or formaldehyde in the whitewash, as a much more effective sterilizing agent.

The disinfecting effect of our vigorous northern winters on soil was discussed at some length. Doc stated that for some of the less hardy bacterial rots such as those affecting carnations, chrysanthemums, "snaps," and stocks, a winter's freezing takes care of them in nice shape. Also, some nematodes. It seems, however, that there are several kinds of nematodes, and some of them will withstand a good freezing winter and be ready to continue their destructive work the following spring.

Doc Gregory advised everyone to practice field culture in the preparation of greenhouse soils, expounding the fundamental idea that with an advantageous rotation of field crops, the soil is built up by plants themselves with materials that they make for their own use. Plowing under rotations of such crops as sweetclover, soybeans, and perhaps alfalfa for 2 or 3 years was classed as one of the best methods known to rejuvenate old greenhouse soils. In this natural method of building up soils, the plants used take care of their own bacterial requirements, and supply necessary humus as well as nutrients.

The discussion of soil acidity seemed to drift in the direction of the new problem of water conditioning. On many important crops, the pH value of the soil has been definitely proved a limiting factor. Such crops as roses, gardenias, hydrangeas, azaleas, and tomatoes need a distinctly acid soil for their best development.

Since nearly all well water is well on the alkaline side, continued watering inevitably brings the pH of the soil away from its desired acidity. To counteract this tendency, a company in Detroit, Mich., has developed an apparatus that can be regulated to inject into the water supply phosphoric acid sufficient to bring the pH to any desired level. In addition to controlling pH values, this phosphoric acid supplies a considerable amount of available phosphorus that, considering the cost of the acid used, is a very cheap source of this element.

The Pickrells have developed this system into an even more practical one for their own purpose. All water used in their pot plant range is piped through a special pipe line that connects with an 1100-gallon tank in their service room in which their well water is treated with phosphoric acid. They simply fill their tank with water and pour in approximately a cup of acid that, they have learned, brings the pH of their water down where it belongs. The amount of acid needed was determined by tests made on the water at Purdue. A small electric pump and pressure tank keep the water under pressure in their pipe line at all times. Their Hillman conditioner (lists at $125) is used on special

crops like hydrangeas and azaleas that need unusually acid soil. This outfit is, of course, portable and can be moved and connected to water lines in a minute or two.

Doc Gregory was careful to point out that water conditioning is entirely distinct from water softening that is practiced in dwelling houses to soften water. Water softening removes the so-called "hardness" in water but has practically no effect on its pH value, which makes it useless for this purpose. He also carefully pointed out that this water conditioning isn't a general panacea for wide range of greenhouse troubles! "Men, if you've got a problem of keeping soil acid, use a conditioner," as he very effectively put it.

An interesting side light on this acidity question came out that has a bearing on nitrogen deficiency--a common greenhouse trouble. Unless nitrogen is fed to the plants in a readily available commercial form, the only source of this important element is through the work of nitrifying bacteria and fungi that convert otherwise nonavailable forms into nitrates that the plants can absorb. Those bacteria, like most other forms of life, require certain environmental conditions in which to carry on their valuable work. Soil that is very much on the acid side discourages their work and, of course, leads inevitably to a deficiency in nitrogen. A typical yellowing of foliage identifies this trouble. A bed of "snaps" in our houses last season showed this symptom, and the cause was traced to the fact that we were carrying the house around 40° F. to hold back a too-far-advanced crop of stocks. It seems these little bacteria don't like temperatures that low and were carrying on a very effective sitdown strike. As soon as the temperature went up, they went back to work, and the deficiency symptom abruptly disappeared.

The balance of the afternoon meeting turned into a discussion of plant diseases and their control - Doc's specialty. The discussion that followed evinced more interest in specific control measures and showed the good work Doc has done in spreading fundamental concepts of the nature of plant diseases and general control practices - a necessary prelude to the full understanding of specific control measures. Throughout the whole session, he emphasized the value of <u>preventive</u> measures rather than <u>control</u> measures. Plants kept in full growth and healthy are much more resistant to the attacks of diseases and insects than those carrying on a struggle against improper growing conditions. Therefore, THE CHEAPEST AND MOST EFFECTIVE FIGHT AGAINST DISEASES AND MANY INSECT TROUBLES CONSISTS IN KEEPING PLANTS AS HEALTHY AND VIGOROUS AS POSSIBLE AT ALL TIMES. A close corollary is found in our family doctor's oft repeated warnings about the value of exercise and our good physical condition as the best preventative against troubles such as the common cold.

However, if you do fall by the wayside and allow diseases to catch up with your crops, here are a few specific control measures that do the work:

Rotting of geranium and carnation cuttings in the propagating bed as well as damping-off in the seedlings can definitely be controlled with no injury to plants by applying a mixture of copper carbonate (get it at any drug store) 2 oz. to 5 gal. of water, or use 1 oz. in 5 sq. ft. of cutting sand. Much better than potassium permanganate.

For lily mosaic, the Doc knew of no real control that is practical to use. However, for bulb mite a 10-minute soaking in a 1 to 400 nicotine-sulfate solution kept at 122° F. should effectively do the job. Also calla lily rot can be controlled by soaking the rhizomes in a solution of 28 tablespoons of dry lime sulphur in 3 gal. of water for 3 to 5 minutes.

The common rust that is so familiar on outdoor asters, especially in unusually wet seasons, came up for quite a bit of discussion.

Bordeaux as a spray was discussed at quite some length. . . .

The evening session was given over to Mr. Ball who, after reminiscing about the "good ol' days" in which he served his apprenticeship, spoke at considerable length concerning new developments in growing methods that he has had experience with at West Chicago, and on one of his favorite topics--varieties. . . .

We enjoyed our drive home from Elkhart to West Chicago the next morning--spent most of the time talking over the valuable information, both old and new, we picked up from the meeting as well as the valuable contacts with other growers that are always so illuminating. We wondered also why more States don't take more interest in their tax-paying growers by making this valuable extension service available to them as it is in Indiana and a few other States like Ohio and Michigan. Consider how this meeting benefited the Northern Indiana growers who attended. And further consider that this extension work is Doc's job, and besides these meetings he is constantly helping Indiana growers with innumerable problems--all vitally important to them--that sometimes mean the difference between success and failure. The growing industry is admittedly not as up-to-the-minute as it might be on a lot of things--not the least of which is this highly valuable extension work. New fundamental concepts as well as new applications of old ones are being constantly uncovered by our experiment stations all over the country, and the most practical and thorough method of giving this information the widest distribution possible--and information is useless unless put in the hands of people who are in a position to make use of it--is through the Extension service. . . .
